CLAIMS

What is claimed is:

1   1.   A method for calculating a level of detail (LOD) value for use during
2   computer graphics processing, comprising:
3   (a) identifying a plurality of geometrically arranged coordinates;
4   (b) computing a distance value based on the geometrically arranged coordinates;
5   and
6   (c) calculating a LOD value using the distance value for use during computer
7   graphics processing.

1   2.   The method as recited in claim 1, and further comprising estimating a
2   derivative value based on the geometrically arranged coordinates, wherein
3   the distance value is computed based on the derivative value.

1   3.   The method as recited in claim 2, wherein the geometrically arranged
2   coordinates include (z_0, z_1, z_2, z_3) which are representative of a quadrilateral
3   with z_0 being an upper left corner of the quadrilateral, z_1 being an upper right
4   corner of the quadrilateral, z_2 being a lower left corner of the quadrilateral, z_3
5   being a lower right corner of the quadrilateral.

1   4.   The method as recited in claim 3, wherein the quadrilateral is a 2x2 pixel
2   quadrilateral.

1   6.   The method as recited in claim 3, wherein the derivative value is a derivative
2   with respect to an x-axis.

1   7.   The method as recited in claim 6, wherein the derivative value is calculated
2   using the expression $((z_1 - z_0) + (z_3 - z_2))/2$.

1   8.   The method as recited in claim 3, wherein the derivative value is a derivative

2   with respect to an y-axis.

1   9.   The method as recited in claim 8, wherein derivative value is calculated

2   using the expression $((z_2 - z_0) + (z_3 - z_1))/2$.

1   10.   The method as recited in claim 1, wherein the geometrically arranged

2   coordinates are texture coordinates (u_0, u_1, u_2, u_3).

1   11.   The method as recited in claim 1, wherein the geometrically arranged

2   coordinates are texture coordinates (v_0, v_1, v_2, v_3).

1   12.   The method as recited in claim 1, wherein the geometrically arranged

2   coordinates are texture coordinates (p_0, p_1, p_2, p_3).

1   13.   The method as recited in claim 2, wherein the LOD value is calculated for

2   dependent textures.

1   14.   The method as recited in claim 1, wherein the LOD value is calculated for

2   cube environment mapping.

1   15.   The method as recited in claim 1, and further comprising determining if the

2   geometrically arranged coordinates reside on separate sides of a cube map,

3   and performing a coordinate space transform if the geometrically arranged

4   coordinates reside on separate sides of the cube map.

1   16.   The method as recited in claim 1, and further comprising determining if a

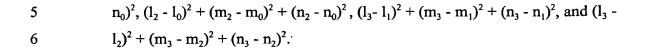2   sign of a q-value of a pixel associated with each coordinate is the same.

1   17.   The method as recited in claim 16, and further comprising setting the LOD

2   value to infinity if it is determined that the sign of the q-value of each pixel is

3   not the same.

1   18.   The method as recited in claim 1, wherein the geometrically arranged

2   coordinates include (z_0, z_1, z_2, z_3) which are representative of a quadrilateral

3   with z_0 being an upper left corner of the quadrilateral, z_1 being an upper right

4   corner of the quadrilateral, z_2 being a lower left corner of the quadrilateral, z_3

5   being a lower right corner of the quadrilateral.

1   19.   The method as recited in claim 18, and further comprising transforming the

2   geometrically arranged coordinates to a different coordinate system (l,m,n),

3   wherein the distance value is estimated using an expression selected from the

4   group of $(l_1 - l_0)^2 + (m_1 - m_0)^2 + (n_1 - n_0)^2$, $(l_2 - l_0)^2 + (m_2 - m_0)^2 + (n_2 - n_0)^2$,

5          $(l_3 - l_1)^2 + (m_3 - m_1)^2 + (n_3 - n_1)^2$, and $(l_3 - l_2)^2 + (m_3 - m_2)^2 + (n_3 - n_2)^2$.

1   20.   A computer program embodied on a computer readable medium for

2   calculating a level of detail (LOD) value for use during computer graphics

3   processing, comprising:

4   (a)   a code segment for identifying a plurality of geometrically arranged

5   coordinates;

6   (b)   a code segment for computing a distance value based on the geometrically

7   arranged coordinates; and

8   (c)   a code segment for calculating a LOD value using the distance value for use

9   during computer graphics processing.

1   21.   The computer program as recited in claim 20, and further comprising a code

2   segment for estimating a derivative value based on the geometrically

3   arranged coordinates, wherein the distance value is computed based on the

4   derivative value.

1   22.   The computer program as recited in claim 21, wherein the geometrically
2   arranged coordinates include (z_0, z_1, z_2, z_3) which are representative of a
3   quadrilateral with z_0 being an upper left corner of the quadrilateral, z_1 being
4   an upper right corner of the quadrilateral, z_2 being a lower left corner of the
5   quadrilateral, z_3 being a lower right corner of the quadrilateral.

1   23.   The computer program as recited in claim 22, wherein the quadrilateral is a
2   2x2 pixel quadrilateral.

1   24.   The computer program as recited in claim 22, wherein the derivative value is
2   a derivative with respect to an x-axis.

1   25.   The computer program as recited in claim 24, wherein the derivative value is
2   calculated using the expression $((z_1 - z_0) + (z_3 - z_2))/2$.

1   26.   The computer program as recited in claim 22, wherein the derivative value is
2   a derivative with respect to an y-axis.

1   27.   The computer program as recited in claim 26, wherein derivative value is
2   calculated using the expression $((z_2 - z_0) + (z_3 - z_1))/2$.

1   28.   The computer program as recited in claim 20, wherein the geometrically
2   arranged coordinates are texture coordinates (u_0, u_1, u_2, u_3).

1   29.   The computer program as recited in claim 20, wherein the geometrically
2   arranged coordinates are texture coordinates (v_0, v_1, v_2, v_3).

1   30.   The computer program as recited in claim 20, wherein the geometrically
2   arranged coordinates are texture coordinates (p_0, p_1, p_2, p_3).

1 31. The computer program as recited in claim 21, wherein the LOD value is
2   calculated for dependent textures.

1 32. The computer program as recited in claim 20, wherein the LOD value is
2   calculated for cube environment mapping.

1 33. The computer program as recited in claim 20, and further comprising a code
2   segment for determining if the geometrically arranged coordinates reside on
3   separate sides of a cube map, and a code segment for performing a coordinate
4   space transform if the geometrically arranged coordinates reside on separate
5   sides of the cube map.

1 34. The computer program as recited in claim 20, and further comprising a code
2   segment for determining if a sign of a q-value of a pixel associated with each
3   coordinate is the same.

1 35. The computer program as recited in claim 34, and further comprising a code
2   segment for setting the LOD value to infinity if it is determined that the sign
3   of the q-value of each pixel is not the same.

1 36. The computer program as recited in claim 20, wherein the geometrically
2   arranged coordinates include (z_0, z_1, z_2, z_3) which are representative of a
3   quadrilateral with z_0 being an upper left corner of the quadrilateral, z_1 being
4   an upper right corner of the quadrilateral, z_2 being a lower left corner of the
5   quadrilateral, z_3 being a lower right corner of the quadrilateral.

1 37. The computer program as recited in claim 36, and further comprising a code
2   segment for transforming the geometrically arranged coordinates to a
3   different coordinate system (l,m,n), wherein the distance value is estimated
4   using an expression selected from the group of $(l_1 - l_0)^2 + (m_1 - m_0)^2 + (n_1 -$

5      $n_0)^2$, $(l_2 - l_0)^2 + (m_2 - m_0)^2 + (n_2 - n_0)^2$, $(l_3 - l_1)^2 + (m_3 - m_1)^2 + (n_3 - n_1)^2$, and $(l_3 - $

6      $l_2)^2 + (m_3 - m_2)^2 + (n_3 - n_2)^2$.

1   38.   A system for calculating a level of detail (LOD) value for use during

2   computer graphics processing, comprising:

3   (a)   logic for identifying a plurality of geometrically arranged coordinates;

4   (b)   logic for computing a distance value based on the geometrically arranged

5   coordinates; and

6   (c)   logic for calculating a LOD value using the distance value for use during

7   computer graphics processing.